U.S. NUCLEAR REGULATORY COMMISSION

REGION II

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Report Nos:	50-280/97-10, 50-281/97-10
Licensee:	Virginia Electric and Power Company (VEPCO)
Facility:	Surry Power Station, Units 1 & 2
Location:	5850 Hog Island Road Surry, VA 23883
Dates:	October 5 - November 15, 1997
Inspectors:	R. Musser, Senior Resident Inspector K. Poertner, Resident Inspector P. Byron, Resident Inspector J. Blake, Reactor Inspector (Sections M1.1, M1.2, and M1.3) P. Hopkins, Project Engineer (Sections O1.7, M1.5 and M1.6) D. Jones, Reactor Inspector (Sections R1.1 and R8.1) W. Stansberry, Security Inspector (Sections S1.2, S2.1, S2.2, S2.3, S3.1, and S3.2)
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ENCLOSURE 2

EXECUTIVE SUMMARY

Surry Power Station, Units 1 & 2
NRC Inspection Report Nos. 50-280/97-10 and 50-281/97-10

This integrated inspection included aspects of licensee operations, engineering, maintenance, and plant support. The report covers a six-week period of resident inspection; in addition, it includes the results of announced inspections by four regional inspectors.

Operations

- Operators performed their assigned duties in an excellent manner during the Unit 2 shutdown for a scheduled refueling outage. The Senior Reactor Operator maintained excellent command and control during the evolution (Section O1.2).

- The licensee's actions to identify an intake canal level probe common mode failure scenario demonstrated a good safety perspective and were conducted in a conservative and professional manner. An Inspection Followup Item was identified to review the licensee's root cause evaluation and proposed corrective actions to prevent recurrence (Section O1.3).

- Increased Unit 1 reactor coolant activity indicated that a fuel cladding defect had occurred. The licensee was monitoring and trending coolant activity on a routine basis. The activity was well below Technical Specification allowable values (Section O1.4).

- Licensee actions to identify and report the Anticipated Transient Without A Scram Mitigating System Actuation Circuitry enable setpoint problem exhibited a good questioning attitude and conservative approach to operations. An Inspection Followup Item was identified to review licensee actions to resolve the issue (Section O1.5).

- A Non-cited Violation was identified concerning the failure to perform a Technical Specification required surveillance on the diesel driven fire pump within the required frequency (Section O1.6).

- Control room charts were observed to be operating correctly and control room logs were routinely reviewed by operations personnel. Plant startup evolutions were conducted in accordance with approved procedures (Section O1.7).

- No problems were identified during a review of Unit 2 containment integrity during fuel movement (Section O1.8).

- The licensee's preparation of the Unit 2 containment prior to restart from the refueling outage was adequate. Minor deficiencies were identified and corrected prior to containment closeout (Section O1.9).

- Observations by the inspectors during the defueling of the Unit 2 reactor indicated a well controlled process being carried out in accordance with Technical Specifications (Section O1.10).

Maintenance

- The licensee's inservice inspection results were well documented, and the bases for conclusions were conservative (Section M1.1).
- The decision to repair a leaking spare reactor head penetration seal weld using a mechanical fixture was fully supported by engineering analysis (Section M1.1).
- Radiographs of replacement piping welds were in accordance with required codes and standards (Section M1.1).
- Consistent evaluations of eddy current inspection results and conservative tube plugging decisions were strengths in the licensee's steam generator inspection program (Section M1.2).
- The licensee's flow accelerated corrosion monitoring program continued to be a well-engineered and conservative program (Section M1.3).
- Surveillance activities associated with safety injection accumulator check valve testing and Number 3 EDG testing were conducted in accordance with approved procedures and met acceptance criteria (Section M1.4).
- Maintenance activities on protective relays and the condenser water box were performed satisfactorily. Work procedures were adequate and were being followed (Section M1.5).
- Thirteen observed surveillance tests were performed satisfactorily (Section M1.6).
- An unresolved item was opened to track resolution of an interpretation of Technical Specification surveillance frequency requirements (Section M1.7).
- A violation was identified for inadequate work instructions resulting in the failure to implement the prerequisite requirements of a safety evaluation during the replacement of a Consequence Limiting Safeguards relay (Section M1.8).
- The licensee rebuilt the pressurizer Power Operated Relief Valves during the Unit 2 Refueling Outage. Following return of the unit to service, no indication of seat leakage was observed (Section M1.9).
- The licensee successfully replaced the "C" Reactor Coolant Pump flange seal. Installation of pump flange seal bolt number 16 as a "no load" bolt was determined to be a viable option (Section M1.10).
- Testing on the Unit 2 pressurizer power operated relief valves was conducted in a cautious and controlled manner and as specified by the procedure. The Senior Reactor Operator supervising the test

demonstrated superior command and control over the evolution (Section M1.11).

Engineering

- Letdown line modifications were performed during the Unit 2 refueling outage to correct previous problems with weld leakage (Section E1.1).
- The inspectors verified that the Unit 2 vital bus Appendix R modifications had been implemented during the refueling outage (Section E1.2).

Plant Support

- During the Unit 2 Refueling Outage, the licensee was properly monitoring and controlling personnel radiation exposure and posting area radiological conditions in accordance with 10 CFR Part 20 (Section R1.1).
- Personnel entering the Radiological Controlled Area (RCA) were adequately briefed on radiological hazards and protective measures (Section R1.1).
- Housekeeping in the RCA was very good during the Unit 2 Refueling Outage (Section R1.1).
- A significant amount of activity was removed from the Reactor Coolant System by shutdown chemistry controls in order to reduce exposure to workers during the Unit 2 Refueling Outage (Section R1.1).
- Health physics practices were observed to be proper (Section R1.2).
- Security and material condition of the protected area perimeter barrier were acceptable (Section S1.1).
- Compensatory measures were used for vital area access breaches (Section S1.2).
- The evaluation of the licensee's program for protected area access controls for packages, personnel and vehicles revealed that the criteria of the Physical Security Plan were being followed (Section S2.1).
- Criteria in Chapters 1, 4, and 6 of the Physical Security Plan and Security Plan Implementing Procedures were complied with for alarm stations and communications (Section S2.2).
- Intrusion detection systems and assessment aids were functional, well maintained, effective for both covert and overt penetration attempts, and met licensee commitments (Section S2.3).

- The review and verification of commitments of selected security and administrative procedures did not identify any inconsistencies or noncompliance (Section S3.1).

- The review of three quarterly Security Event Logs verified that the licensee was appropriately analyzing, tracking, resolving, and documenting safeguards events (Section S3.2).

Report Details

Summary of Plant Status

Unit 1 operated at power the entire reporting period.

Unit 2 shutdown for a scheduled refueling outage which began on October 6. The unit was returned to service on October 31 after the completion of a 25 day refueling outage.

I. Operations

01 Conduct of Operations

01.1 General Comments (71707 40500)

The inspectors conducted frequent control room tours to verify proper staffing, operator attentiveness, and adherence to approved procedures. The inspectors attended daily plant status meetings to maintain awareness of overall facility operations and reviewed operator logs to verify operational safety and compliance with Technical Specifications (TSs). Instrumentation and safety system lineups were periodically reviewed from control room indications to assess operability. Frequent plant tours were conducted to observe equipment status and housekeeping. Deviation Reports (DRs) were reviewed to assure that potential safety concerns were properly reported and resolved. The inspectors found that daily operations were generally conducted in accordance with regulatory requirements and plant procedures.

1.2 Unit 2 Shutdown for Refueling Outage (RFO)

a. Inspection Scope (71707)

On October 5, the inspectors observed the licensee remove Unit 2 from service and shutdown the reactor in preparation for RFO 14.

b. Observations and Findings

On October 5, the licensee commenced shutting down the Unit 2 reactor in preparation for RFO 14. The inspectors noted that the Senior Reactor Operator (SRO) maintained excellent command and control. Briefings were thorough and detailed. The SRO gave frequent briefings before each significant evolution. The operators did an excellent job maintaining steam generator level and feedwater flow. Procedures were at the stations and were utilized. The generator output circuit breaker was opened at 12:37 a.m. on October 6 and the reactor was tripped 20 minutes later. All systems functioned as designed.

c. Conclusions

Operators performed their assigned duties in an excellent manner during the Unit 2 shutdown for a scheduled refueling outage. The SRO maintained excellent command and control during the evolution.

01.3 Inoperable Intake Canal Level Probes

a. Inspection Scope (71707)

The inspectors reviewed licensee activities associated with inoperable intake canal level probes due to marine growth.

b. Observations and Findings

On October 14, with Unit 2 shutdown for a scheduled refueling outage, intake canal level probe 2-CW-LE-202 was removed from service to perform response time testing. The as-found response time did not meet the required minimum response time. The level probe was cleaned, retested, and returned to service. Canal level probe 2-CW-LE-203 was then removed from service for testing. The as-found response time for level probe 2-CW-LE-203 also did not meet the acceptance criteria. The probe was cleaned, retested, and returned to service. Based on the conclusion that both Unit 2 canal level probes had been inoperable due to a common mode failure mechanism (marine growth) the licensee declared both Unit 1 canal level probes inoperable and entered a six-hour action statement at 5:26 p.m. to place Unit 1 in hot shutdown in accordance with TS 3.0.1. The Unit 1 level probes were tested, cleaned, and returned to service. The as-found values for the Unit 1 canal level probes did not meet the response time acceptance criteria. The six-hour action statement was exited at 8:10 p.m. following the return to service of the Unit 1 level probes.

The inspectors monitored testing activities in progress, reviewed the applicable TS and verified that the NRC was notified as required by 10 CFR 50.72. The licensee initiated a Category 1 root cause evaluation to determine the cause of the event and corrective actions to prevent recurrence. The root cause evaluation was still in progress at the end of the inspection period. Review of the licensee's root cause evaluation and proposed corrective actions is identified as Inspection Followup Item (IFI) 50-280, 281/97010-01.

c. Conclusions

The licensee's actions to identify an intake canal level probe common mode failure scenario demonstrated a good safety perspective and were conducted in a conservative and professional manner. An IFI was identified to review the licensee's root cause evaluation and proposed corrective actions to prevent recurrence.

01.4 Unit 1 Failed Fuel

a. Inspection Scope (71707)

The inspectors reviewed licensee actions with respect to increased Unit 1 coolant activity.

b. Observations and Findings

On October 7, an increase in Unit 1 containment gaseous activity was observed. Subsequent sampling of the Reactor Coolant System (RCS) identified that the xenon and Iodine 131 concentrations had increased from previous samples. On October 15, power was reduced to perform maintenance activities. Subsequent to the power reduction an iodine spike was observed. When the unit was returned to 100 percent power, iodine levels subsequently returned to the previous steady state values. The increased activity and subsequent iodine spike following a power reduction indicated that a fuel cladding defect had occurred. Discussions with reactor engineering determined that the fuel failure was most likely located in a low power position on or near the periphery of the core and was limited to one fuel pin. The inspectors routinely reviewed reactor coolant sample results and activity levels were well within TS allowable values. The licensee plans to monitor and trend RCS activity on a normal frequency unless a significant increase in RCS activity occurs.

c. Conclusions

Increased Unit 1 RCS activity indicate that a fuel cladding defect had occurred. The licensee was monitoring and trending RCS activity on a routine basis. RCS activity was well below TS allowable values.

01.5 Anticipated Transient Without A Scram Mitigating System Actuation Circuitry (AMSAC)

a. Inspection Scope (71707)

The inspectors reviewed a one hour non-emergency event report associated with arming of the AMSAC circuitry.

b. Observations and Findings

On November 12, the licensee made a one hour non-emergency report to the NRC concerning the interlock setpoint for AMSAC. The circuitry automatically enables at 37 percent power as indicated by turbine first stage impulse pressure. The design basis of the system assumes that the system is enabled at 40 percent reactor thermal power. On November 2, during the Unit 2 power ascension following a refueling outage the AMSAC circuitry enabled at 37 percent turbine first stage pressure but reactor thermal power indicated greater than 40 percent (41-42 percent). A DR was initiated to document the apparent discrepancy between the actual thermal power level that the circuitry was enabled at and the

power referenced in the Updated Final Safety Analysis Report. Subsequent review of the DR determined that the system was outside its design basis.

Requirements for AMSAC are not contained in the TS. The licensee administratively controls AMSAC operability in accordance with Virginia Power Administrative Procedure (VPAP) 2802, "Notifications and Reports," Revision 7. The VPAP requires that if AMSAC is inoperable for 30 days, a special report shall be submitted to the NRC within the next 30 days. The licensee is still reviewing the issue to determine corrective actions to ensure that AMSAC enables within the design basis of the system. Further review of licensee actions to resolve the issue is identified as IFI 50-280, 281/97010-02.

c. Conclusions

Licensee actions to identify and report the AMSAC enable setpoint problem exhibited a good questioning attitude and conservative approach to operations. An IFI was identified to review licensee actions to resolve the issue.

01.6 Missed Surveillance Requirement

a. Inspection Scope (71707)

The inspectors reviewed the circumstances surrounding the failure to perform a TS required surveillance within the required time period.

b. Observations and Findings

On October 28, the licensee determined that a TS required Periodic Test (PT) on the diesel driven fire pump had not been performed within the TS required frequency. The pump was declared inoperable and the missed surveillance was performed satisfactorily that same day. TS requires that the PT be performed every 31 days. With the TS allowed grace period included, the surveillance frequency was exceeded by nine days.

The PT was scheduled to be performed within the required frequency by the Operations Department, however, the PT was incorrectly initialed as being completed by the operating shift on the PT work schedule due to a personnel error. Subsequently, engineering notified operations that the PT had not been received for final review and processing. Review by operations determined that the PT had not been performed and the TS required frequency had been exceeded without declaring the diesel driven pump inoperable.

The inspectors discussed this event with licensee personnel and reviewed the corrective actions identified to prevent recurrence. Discussed corrective actions for this matter included: satisfactorily completing the surveillance, initiating a DR (S-97-3132), counseling the involved individual and adding an administrative enhancement to require comparison of completed surveillance procedures with the surveillance

work schedule. This non-repetitive, licensee identified and corrected violation is being treated as a Non-cited Violation (NCV) consistent with Section VII.B.1 of the NRC Enforcement Policy. This matter is identified as NCV 50-280, 281/97010-03.

c. Conclusions

An NCV was identified concerning the failure to perform a TS required surveillance on the diesel fire pump within the required frequency.

O1.7 Review of Shift Activities During Unit 2 Startup

a. Inspection Scope (71707)

The inspectors reviewed shift logs and control room chart recorders and observed shift activities during the Unit 2 startup from refueling.

b. Observations and Findings

During October 27-31, the inspectors reviewed operation of the control room chart recorders for both units to assure that pens were marking properly and the recorders were timing correctly. The inspectors verified that each chart had been checked by a licensed operator each shift. Recorders not in use were clearly marked as being out-of-service.

The inspectors observed that shift logs were frequently reviewed by control room operators. Additionally, operators maintained positive control of the plant during pre-job briefings and during the performance of periodic test procedures.

Preparations for reactor startup and plant operations while transitioning from the refueling outage to power operations were conducted safely with good control and communications. Plant operators demonstrated good knowledge and awareness of changing plant conditions. The actions of the plant operators while taking the reactor critical were conducted in accordance with approved procedures.

c. Conclusions

Control room charts were observed to be operating correctly and control room logs were routinely reviewed by operators. Plant startup evolutions were conducted in accordance with approved procedures.

O1.8 Refueling Containment Integrity

a. Inspection Scope (71707)

The inspectors reviewed containment integrity requirements during Unit 2 refueling activities.

b. Observations and Findings

The inspectors verified that containment integrity was in place prior to the off-load of fuel assemblies during the Unit 2 RFO. The inspectors reviewed applicable procedures and independently verified selected portions of the containment isolation boundary.

c. Conclusions

No problems were identified during a review of Unit 2 containment integrity during fuel movement.

01.9 Unit 2 Containment Closeout Walkdown

a. Inspection Scope (71707)

On October 27, the inspectors performed a containment closeout walkdown to review containment conditions prior to unit restart.

b. Observations and Findings

The inspectors performed a walkdown of the Unit 2 containment prior to the restart. The station manager accompanied the inspectors on the walkdown. The walkdown encompassed all levels and rooms within the containment. Prior to the walkdown, the licensee stated that with the exception of a few specific areas and items still staged for specific tasks and tests, the containment was ready to support the return to service of the unit. In general, the overall condition of the containment was adequate for the restart of the unit. However, a number of items were discovered during the containment inspection which indicated that a more thorough walkdown should have been performed. These items included the following:

- Tywrap in the containment sump
- Tape on the containment walls and on various pipes
- A failed component cooling water pressure gauge on the "B" RCP
- A refueling tool wrapped in a plastic sleeve
- Numerous small hand tools, wire, nuts, bolts, and threaded 1/4" stock

Upon exiting the containment, responsible licensee personnel were informed of the walkdown findings. A list of these deficiencies was promptly drafted. The items were corrected prior to the containment closeout.

c. Conclusions

The licensee's preparation of the Unit 2 containment prior to restart from the refueling outage was adequate. Minor deficiencies were identified and corrected prior to containment closeout.

O1.10 Unit 2 Refueling Observations

a. Inspection Scope (71707)

The inspectors observed the defueling of the Unit 2 Reactor.

b. Observations and Findings

Fuel handling evolutions were observed both in the containment and fuel building. All observations indicated that the process was well controlled and was adequately supervised. Technical Specification requirements for refueling were being met. A monitor was posted at the access to the refueling cavity to ensure all personnel entering the area were trained in foreign material exclusion practices and were not taking unnecessary items into the area. The refueling evolution for the Unit 2 reactor was completed in accordance with specified requirements.

c. Conclusions

Observations by the inspectors during the defueling of the Unit 2 reactor indicated a well controlled process being carried out in accordance with Technical Specifications.

II. MAINTENANCE

M1 Conduct of Maintenance

M1.1 Inservice Inspection (ISI)

a. Inspection Scope (73753)

The inspectors reviewed ISI activities for the Unit 2 refueling outage. The ISI review included fabrication and pre-service inspections for piping welds made as the result of repairs, replacements, and modifications.

b. Observations and Findings

This was the first refueling outage in the second, 40-month period of the third, 10-year, ISI interval. The third, 10-year interval started May 10, 1994, and the ISI Code of record is ASME Section XI, 1989 Edition with no addenda.

The records for five VT3 component support inspections, eleven VT1 component inspections, sixteen piping component ultrasonic examinations, twenty-eight piping component surface examinations, three reactor coolant pump flywheel examinations, and seven reactor coolant isolation valve stud examinations were reviewed by the inspectors. The licensee was using computer software for the recording of ISI examination data and examiner conclusions, and to generate required reports. As a result of using the computer, all reports were concise, complete, and legible.

During in situ ultrasonic examination (UT) of the 22.5-inch long, by 2.75-inch diameter studs in the "C" cold-leg, loop stop-valve, MOV2595, several studs showed a reflector that appeared just beyond the back reflection from the end of the stud. This reflector was of concern to the UT examiners because it was similar to one of the reflectors received from one of the notches in the calibration block.

The inspectors reviewed the final disposition of the UT indications in Stud No. 11, (the one with the largest signal) which was removed from the valve and replaced. The suspect Stud No. 11 was subjected to visual, fluorescent liquid penetrant, and additional ultrasonic examinations. The original ultrasonic signal was still present after removal, but there were no indications found by the visual and surface examinations. Based on these additional examinations, the licensee concluded that the signals were geometric or beam redirection signals, and therefore the remaining studs were acceptable for continued service. The inspectors agreed with the conclusions reached by the licensee.

The licensee's visual inspections of the reactor vessel head revealed boron residue on the stalk of Spare Head Penetration Number 19. The residue emanated from the area of the welded seal canopy at the threaded connection to the stalk. After reviewing available options for the repair of the leaking seal canopy, the licensee elected to use a mechanical fixture manufactured by ABB-Combustion Engineering (ABB-CE).

The inspectors monitored the licensee's decision process, and reviewed the completed 10 CFR 50.59 analysis for this application of a mechanical fixture to repair a reactor coolant pressure boundary leak. By definition, the welded seal canopy only provides a leak barrier for the acme-threaded connection which is the reactor coolant boundary; therefore, the inspectors agreed that the use of a mechanical fixture would not require NRC approval.

The inspectors reviewed the radiographs associated with the replacement of piping components in reactor coolant and secondary systems. Particular attention was given to radiographs of welds involved with the replacement of components in the reactor coolant letdown system and steam generator feedwater piping inside containment. The radiographs reviewed were of acceptable quality. The inspectors agreed with the licensee's interpretation of weld quality.

c. Conclusions

The licensee's inservice inspection results were well documented, and the bases for conclusions were conservative. The decision to repair a leaking spare reactor head penetration seal weld using a mechanical fixture was fully supported by engineering analysis. Radiographs of replacement piping welds were in accordance with required codes and standards.

M1.2 Steam Generator Inspection

a. Inspection Scope (50002)

The inspectors reviewed procedures and documentation associated with the eddy current examination of the Unit 2 "B" Steam Generator (SG).

b. Observations and Findings

The Unit 2, Model 51 SGs were replaced with Model 51F SGs in 1980. The Model 51F SGs contain thermally treated Alloy 600 Inconel tubing with stainless steel quatrefoil support plates. The tube ends were hydraulically expanded for the full depth of the tube sheet.

Since 1993, the licensee's SG inspection program required that one SG be comprehensively inspected per outage. The SG inspected during the current outage was the "B" SG. The inspection consisted of a bobbin inspection of 100% of the tubes; a Motorized Rotating Pancake Coil (MRPC) inspection of 20% of the tubes at the top of the tubesheet; and an MRPC inspection of 20% of the Row 1, U-Bends. The licensee also conducted a comparative study of eleven indications, found with their standard 0.115-coil MRPC probe, using Plus Point eddy current ultrasonic examinations.

As a result of the eddy current examinations, the licensee elected to plug five tubes. Three of the tubes, R37-C59, R36-C69, and R40-C70, were plugged due to measured AntiVibration Bar (AVB) wear. The measured AVB wear was only approximately 20% through-wall, but conservative growth rate calculations postulated growth to near 40% through-wall by the end of three operating cycles, when SG "B" is due for its next inspection. The other two tubes, R1-C34 and R1-C35, contained indentation restrictions at the top of the tubesheet. The licensee postulated that the tubes had been "dinged" during a past pressure pulse/chemical cleaning operation in June 1994, and elected to plug the tubes as a precautionary measure.

The inspection plan and results were discussed during a conference call between NRC and the licensee on October 22, 1997.

c. Conclusions

Consistent evaluations of eddy current inspection results and conservative tube plugging decisions were strengths in the licensee's steam generator inspection program.

M1.3 Flow Accelerated Corrosion (FAC) Program

a. Inspection Scope (49001)

The inspectors reviewed procedures, records, and documents related to the monitoring of FAC in secondary piping and components.

b. Observations and Findings

The inspectors reviewed the records associated with the inspection and replacement of piping components in the steam and feedwater systems. The records showed that the FAC program is a mature program, in that predictions for the amount of wall loss in the piping systems were generally accurate. In the majority of cases with unacceptable wall thicknesses, the program had predicted these results, and replacement piping components were on hand.

The inspectors did note an exception to the FAC program predictions occurred in a straight run of piping immediately downstream of a flow control valve. This area of corrosion was not predicted by the computer program, but was included for inspection because of the licensee's FAC engineering personnel monitoring experiences at other plants, where FAC in piping downstream of flow control valves had been observed. Without available replacement piping, the licensee was able to justify using a weld buildup to restore the required wall thickness until the next refueling outage.

c. Conclusions

The licensee's flow accelerated corrosion monitoring program continued to be a well-engineered and conservative program.

M1.4 Emergency Diesel Generator (EDG) and Safety Injection (SI) Accumulator Check Valve Testing

a. Inspection Scope (61726)

The inspectors observed portions of surveillance tests performed on the Number 3 EDG and Safety Injection Accumulator check valves.

b. Observations and Findings

On October 5, the inspectors observed portions of Operations Periodic Test (OPT) 0-OPT-EG-001, "Number 3 Emergency Diesel Generator Monthly Start Exercise," Revision 10-P1. The inspectors considered that the pre-job brief was thorough and the precautions were adequately discussed. The operators had the procedure at the job site and constantly used it. The inspectors observed independent verification of procedural steps. The operators were cautious and thorough. The results of the OPT were satisfactory.

On October 15, the inspectors observed portions of 2-OPT-SI-022, "SI Accumulator Discharge Check Valve Test With Reactor Head Removed," Revision 1-P1. The test was modified to allow for performing the surveillance with the Reactor Vessel Upper Internals not installed. The core specimen access plugs were removed to prevent them from becoming dislodged and falling to the bottom of the reactor vessel. The upper internals are normally placed in the reactor vessel for the performance of this test and they rest on the access plugs which prevents them from

becoming dislodged. The surveillance verifies by acoustic monitoring or accumulator discharge flow that the check valves stroke full open. The check valves in each accumulator line are tested by acoustic monitoring every third refueling cycle. Accumulator line "A" check valves, 2-SI-107 and 2-SI-109, were acoustically monitored during RFO 14. The inspectors reviewed Safety Evaluation 96-045, Revision 3, which evaluated the performance of the test with the upper internals removed. The inspectors also reviewed completed Procedure 2-OPT-SI-022, Revision 1-P1. All six SI check valves met the acceptance criteria as specified in 2-OPT-SI-022.

c. Conclusions

Surveillance activities associated with SI accumulator check valve testing and Number 3 EDG testing were conducted in accordance with approved procedures and met acceptance criteria.

M1.5 Maintenance Activities

a. Inspection Scope (62707)

The inspectors observed and reviewed maintenance activities to verify that activities were conducted in accordance with TS, procedures, regulatory guides, and industry codes or standards.

b. Observations and Findings

The inspectors observed all or portions of the following Work Order (WO) activities:

- WO-368064 Perform protective relay maintenance and testing
- WO-374842-01 Scrape, clean tubes and return "B" condenser water box to service

The inspectors found that the maintenance activities were performed with the proper tools on the correct equipment with the procedures and work packages present and in use. Pre-job briefings were accomplished with appropriate personnel. Supervisory personnel were present to ensure procedural adherence.

c. Conclusions

The observed maintenance activities were performed satisfactorily. Work procedures were adequate and were being followed.

M1.6 Surveillance Observations

a. Inspection Scope (61726)

The inspectors observed and reviewed surveillance testing activities to verify that testing was performed in accordance with procedures, test

instrumentation was calibrated, Limiting Condition for Operations (LCOs) were met, and any deficiencies identified were properly reviewed and resolved.

b. Observations and Findings

The inspectors observed all or portions of the following surveillance tests:

- 2-NSP-RX-014 "Control Rod Exercises," Revision 4
- 2-IPT-RP-AFW-001 "Under Voltage and Low-Low Steam Generator Logic Start of the Steam Driven Auxiliary Feed Water Pump," Revision 6
- 2-PT-8.5 "Consequence Limiting Safeguards Logic (Hi-Hi Train) Verify Operability," Revision 9
- 2-IPT-RP-TM-001 "Turbine Trip Signal Input to Reactor Protection System Functional Test," Revision 6
- 2-IPT-CC-MS-484 "Steam Line Flow Protection Loop F-2-484 Channel Calibration," Revision 8
- 2-IT-CC-RC-412 "Delta T and T_{AVG} Loop T-2-412 Channel Calibration," Revision 16
- 2-PT-8.2 "Reactor Protection Logic Operability," Revision 10
- 2-OPT-FW-001 "Motor Driven Auxiliary Feedwater Pump 2-FW-P3A Operability Test," Revision 5
- 2-OPT-FW-002 "Motor Driven Auxiliary Feedwater Pump 2-FW-P3B Operability Test," Revision 6
- 2-NPT-RX-014 "Hot Rod Drive By Bank Operability," Revision 4
- 2-NSP-RX-005 "RPI Calibration Data Collection," Revision 6
- 2-OP-RX-006 "Withdrawal Of Control Rods Banks To Critical Conditions," Revision 6
- 2-IT-CC-RPI-001 "Analog Rod Position Indication System Operability," Revision 4

The inspectors found that the work performed under these activities was conducted in a very professional manner. All of the surveillances observed were performed with the procedures present and in use. Effective crew briefings were accomplished prior to performance of the PTs.

c. Conclusions

Thirteen observed surveillance tests were performed satisfactorily.

M1.7 Refueling Surveillance Frequency Requirements

a. Inspection Scope (61726)

The inspectors reviewed an issue involving surveillance frequency requirements specified in Section 4.1 of the TS.

b. Observations and Findings

During a routine inspection, questions were raised concerning the TS surveillance frequency requirements specified in TS Section 4.1. Specifically, Table 4.1-1, "MINIMUM FREQUENCIES FOR CHECK, CALIBRATIONS, AND TEST OF INSTRUMENTATION CHANNELS," defines frequency "R" as "Each Refueling Shutdown," while Table 4.1-2, "ACCIDENT MONITORING INSTRUMENTATION SURVEILLANCE REQUIREMENTS," defines frequency "R" as "Refueling." Table 4.1-2A, "MINIMUM FREQUENCY FOR EQUIPMENT TESTS," specifies a frequency of "Each refueling shutdown" for line items 3, 6, 8, 14a and b, 15, 16, 17, and 18. The licensee has interpreted the frequency of terms "Each Refueling Shutdown" and "Refueling" to be any time during the 18-month operating cycle. If a surveillance test with a specified frequency of "Each Refueling Shutdown" or "Refueling" can only be accomplished during a unit shutdown, the licensee performs it at that time. However, if the licensee has determined that a test with these specified frequencies can be performed with the unit on-line, they view that the test can be performed at any time within the 18-month operating cycle. The licensee has an informal practice of accomplishing these on-line tests 30 days or less prior to a unit refueling outage.

The validity of the licensee's TS interpretation is being reviewed by the NRC. Until this matter is resolved, this matter will be tracked as Unresolved Item 50-280, 281/97010-04.

c. Conclusions

An unresolved item was opened to track resolution of an interpretation of TS Surveillance frequency requirements.

M1.8 Safety Evaluation of Relay Replacement/Engineered Safety Feature (ESF) Actuation

a. Inspection Scope (62707)

The inspectors reviewed the circumstances surrounding an ESF Actuation during the replacement of a Consequence Limiting Safeguards (CLS) Relay.

b. Observations and Findings

On October 11, at approximately 2:22 p.m., during the replacement of Relay 1B12 in the "B" train of the Unit 2 Hi-CLS circuitry, an inadvertent short circuit occurred while landing a lead which actuated the "B" train of Hi-CLS. At the time of the event, Unit 2 was in refueling shutdown with the Residual Heat Removal System in service. The actuation of the "B" train of Hi-CLS caused the actuation of the "B" train of Safety Injection (SI). All equipment expected to actuate on the Hi-CLS and SI responded as designed (with the exception of equipment removed from service). The Number 3 Emergency Diesel Generator auto started but did not synchronize to its bus as power was never lost from its associated bus. At no time during the event was the residual heat removal capability lost. Following verification that a valid Hi-CLS signal was not present, the operators returned equipment to the normal standby condition. This matter was reported to the NRC in accordance with 10 CFR 50.72 and 50.73.

In preparation for the relay replacement, the licensee drafted Temporary Modification S2-97-8 which provided instructions to install a jumper to allow the replacement of Relay 1B12. This Temporary Modification was supported by Safety Evaluation 97-138 which stated that train "B" of Safety Injection would be defeated during the evolution. The safety evaluation further stated that a formal tracking mechanism would be used to ensure that this condition was met. Contrary to these specified requirements, the Safety Injection signal was not defeated nor was a formal tracking method used to ensure the condition was met due to inadequate implementing instructions in the controlling work documents. Specifically, Work Order (WO 00375660-02) and Procedure O-ECM-1801-01. "Westinghouse Type BF or BFD Relay Replacement," Revision 10, the procedures controlling the relay replacement activity, did not contain specific instructions to ensure that the requirements specified in Safety Evaluation 97-138 were implemented. This failure represents a breakdown in controlling plant configuration for a maintenance activity. This is a violation of Technical Specification 6.4.A.7 and will be tracked as Violation 50-281/97010-05.

c. Conclusions

A violation was identified for inadequate work instructions resulting in the failure to implement the prerequisite requirements of a safety evaluation during the replacement of a CLS relay.

M1.9 Unit 2 Pressurizer Power Operated Relief Valve (PORV) Maintenance

a. Inspection Scope (62707)

The inspectors reviewed licensee activities involving corrective maintenance of the Unit 2 pressurizer PORVs.

b. Observations and Findings

Prior to the Unit 2 RFO, PORV 2-RC-PCV-2456 was inoperable with its associated block valve closed due to valve seat leakage. Pressurizer PORV seat leakage has been an ongoing problem and was not successfully addressed for the Unit 1 pressurizer PORVs during the previous Unit 1 RFO.

During the October, 1997, Unit 2 RFO, the licensee rebuilt both pressurizer PORVs in accordance with procedure 0-MCM-0419-01, "Copes-Vulcan 2 Inch 1500 LB Reverse Acting Valve Overhaul," Revision 8. During the overhaul of the valves, direct oversight of the Virginia Power Maintenance personnel was provided by a Copes-Vulcan vendor representative. This maintenance overhaul included the replacement of numerous valve parts (valve plug, cage, packing, stem and various gaskets). The inspectors reviewed the associated documentation for the pressurizer PORV overhaul and found no discrepancies.

Following the return of Unit 2 to service on October 31 and for the remainder of the inspection period, no abnormal pressurizer PORV tailpipe temperatures have been noted. Monitoring tailpipe temperatures for the remainder of the operating cycle will ultimately determine the success of the pressurizer PORV repair.

c. Conclusions

The licensee rebuilt the pressurizer PORVs during the Unit 2 RFO. Following return of the unit to service, no indication of seat leakage was observed.

M1.10 Unit 2 C Reactor Coolant Pump (RCP) Flange Seal Replacement

a. Inspection Scope (62707)

The inspectors observed and reviewed the licensee's actions to replace the Unit 2 "C" RCP flange seal during the RFO.

b. Observations and Findings

Prior to the Unit 2 RFO, the licensee determined that the "C" RCP flange seal would be replaced due to observed flange leakage. To gain access to the seal, this evolution required removal of the RCP motor and lower rotating unit including the 24 flange bolts.

While in the process of removing the 24 flange bolts, the licensee experienced difficulty in the removal of bolt number 16. Following the removal of bolt number 16, inspection of the bolt hole revealed that the majority of the threads were no longer intact (having been stripped during bolt removal).

The licensee determined that in lieu of repairing the damaged threads during the present refueling outage, they would replace the RCP with bolt number 16 as a "no load" bolt. To support this decision, the

licensee obtained a detailed analysis from Westinghouse demonstrating the acceptability of this option. This option recommended that during the operating cycle, if the unit was to go to cold shutdown twice, the pre-load on the remaining 23 bolts should be verified as acceptable prior to restarting the unit. The licensee also had two machining vendors inspect the damaged bolt hole to provide permanent repair options during a future refueling outage.

The inspectors followed this issue in detail. A review of the information provided by Westinghouse indicated that the "no load" bolt option was viable. The inspectors walkdown of containment with RCS pressure at 300 psig indicated no flange leakage. A licensee walkdown with the unit at normal operating temperature and pressure also indicated no pump flange leakage. RCS leakage following the return of Unit 2 to service was low and continued in this manner for the remainder of the inspection period.

c. Conclusions

The licensee successfully replaced the "C" Reactor Coolant Pump flange seal. Installation of pump flange seal bolt number 16 as a "no load" bolt was determined to be a viable option.

M1.11 Unit 2 Pressurizer PORV Testing

a. Inspection Scope (61726)

The inspector observed a portion of the setup and testing of the pressurizer PORVs prior to the return to service of Unit 2.

b. Observations and Findings

On October 24, the inspectors observed portions of the performance of Procedure 2-OPT-RC-001, "PRZR PORV Refueling Test," Revision 4. This test provides instructions to perform a complete checkout of the Unit 2 pressurizer PORVs and their associated equipment. Testing was conducted in a cautious and controlled manner and as specified by the procedure. The Senior Reactor Operator supervising the test demonstrated superior command and control over the evolution. When problems were encountered, the test was stopped and a well thought out course of action was taken. The test was completed satisfactorily.

c. Conclusions

Testing on the Unit 2 pressurizer PORVs was conducted in a cautious and controlled manner and as specified by the procedure. The Senior Reactor Operator supervising the test demonstrated superior command and control over the evolution.

III. Engineering

E1 Conduct of Engineering

E1.1 Unit 2 Letdown Line Orifice and Valve Replacement

a. Inspection Scope (37551)

The inspectors reviewed the licensee's actions related to replacement of the Unit 2 letdown line orifices and valves.

b. Observations and Findings

On September 11, 1996, the licensee experienced the fourth socket weld failure in the Unit 2 letdown line in 12 months. The licensee determined that the flow orifices (2-CH-RO-20RLD1-3), letdown orifice block valves (2-CH-HCV-2200A-C), and some piping had to be replaced. Design Change Package (DCP) 96-040, "CVCS Letdown Piping Modification," was issued to accomplish this work. The licensee determined that the modification would be accomplished in two phases. They replaced some of the piping and supports downstream of the orifices to change the configuration and replaced, where practical, socket welds with butt welds. This work was accomplished during a December 1996 outage. This effort was documented in more detail in Inspection Report Nos. 50-280, 281/96-13.

The second phase was to replace the orifices and the orifice block valve bodies and modify the valve supports during RFO 14. The replacement valve bodies required butt welds rather than the original socket welds. WOs 357847-01 through -04, 357848-01 through -03, and 357850-01 through -03 were issued to replace the valve bodies (2-CH-HCV-2200A-C). The remainder of the work was accomplished by WOs 351999-02,-03, -16, and -17. The inspectors reviewed DCP 96-040 and the completed WOs and verified that the work scheduled for RFO 14 had been completed. The inspectors verified that DCP 96-040 has been completed.

c. Conclusions

Letdown line modifications were performed during the Unit 2 RFO to correct previous problems with weld leakage.

E1.2 Appendix R Modifications

a. Inspection Scope (37551)

The inspectors verified that the vital bus Appendix R modifications were accomplished during the Unit 2 RFO.

b. Observations and Findings

The inspectors observed portions of the work activities associated with DCP 94-015, "Appendix R Vital Bus Modifications," and verified that the

associated WOs 38332754-01 and -02 had been completed. The modifications replaced the incoming feeder breakers in panels 2-I, 2-IA, 2-II, 2-IIA, 2-III, 2-IIIA, 2-IV, and 2-IVA with manual switches and installed fuse blocks in Uninterruptable Power Supplies 2A-1 and 2A-2. These modifications were implemented to meet the requirements of Appendix R. The licensee plans to implement the modifications on the Unit 1 vital busses at the next scheduled refueling outage.

c. Conclusions

The inspectors verified that the Unit 2 vital bus Appendix R modifications had been implemented during the refueling outage.

IV. Plant Support

R1 Radiological Protection and Chemistry (RP&C) Controls

R1.1 Occupational Radiation Exposure Control Program

a. Inspection Scope (83750)

The inspectors reviewed implementation of selected elements of the licensee's radiation protection program during the Unit 2 RFO. The review included observation of radiological protection activities including pre-work briefings, personnel exposure monitoring, radiological postings, and verification of posted radiation dose rates and contamination levels within the Radiologically Controlled Area (RCA). Those activities were evaluated for consistency with the programmatic requirements, personnel monitoring requirements, occupational dose limits, radiological posting requirements, and survey requirements specified in Subparts B, C, F, G, and J of 10 CFR 20.

b. Observations and Findings

The inspectors conducted frequent tours of the RCA to observe radiation protection activities and practices. Personnel preparing for routine entries into the RCA were observed being briefed on the radiological conditions in the areas to be entered. The briefings were given by radiation control personnel before access was granted and covered the dosimetry, protective clothing, and equipment required by the Radiation Work Permit (RWP) for the entry. The administrative limits for the allowed dose and dose rate for the entry were emphasized during the briefings. The briefings provided thorough descriptions of the existing dose rates which could be encountered during the entry. The inspectors determined that personnel entering the RCA were adequately briefed on the radiological hazards which could be encountered while in the RCA and the radiological protective measures required to be taken during the entry. In addition to observing briefings for routine RCA entries, the inspectors attended a briefing given specifically for work to be performed under RWP 97-2-4102 in the Unit 2 "C" Reactor Coolant Pump (RCP) Cubical. Dose rates in that area were elevated and therefore additional precautions were implemented. Those precautions included

continuous Health Physics coverage, radiation and contamination surveys of the equipment being worked on, and use of telemetric dosimetry. In addition to the radiological conditions and protective measures addressed during briefings for routine entries, the scope of work and detailed discussions of how to accomplish each task were addressed during this briefing. The inspectors determined that personnel were adequately briefed on radiological hazards, protective measures and work to be performed.

The inspectors observed the use of personal radiation exposure monitoring devices by personnel entering and exiting the RCA. Thermoluminescent Dosimeters (TLDs) were used as the primary device for monitoring personnel radiation exposure. In addition, Digital Alarming Dosimeters (DADs) were used for monitoring the accumulated dose and the encountered dose rates during each RCA entry. The DADs were set to alarm at administrative limits established for the specific RWP under which the RCA entry was being made. As the individuals exited the RCA, the accumulated dose and encountered dose rate information was transferred from the DADs to the Personnel Radiation Exposure Management System (PERMS) data base in order to track individual exposures. During tours of the RCA the inspectors noted that the required dosimetry was being properly worn by personnel when entering and while in the RCA. The inspectors also noted that personnel exiting the RCA routinely surveyed themselves for contamination using Personal Contamination Monitors (PCMs).

The inspectors reviewed As Low As Reasonably Achievable (ALARA) program details, implementation, and goals for the current Unit 2 RFO. Based on the scheduled activities, daily and cumulative exposure projections were established. Individual exposures, based on data from DADs and PERMS, were summarized by RWPs on a daily basis and allocated to the various organizational departments. Daily reports of the collective and departmental exposures, along with their respective projected goals were issued for monitoring purposes. Plots of daily and cumulative exposure vs. their respective projections were also distributed daily. The projected cumulative exposure for the planned 30 day Unit 2 RFO was 115 man-rem with a challenge goal of 100 man-rem. As of day 11 of the RFO (October 16) the daily and cumulative exposures were well within the projected and challenge goals for the RFO. The annual ALARA goal for the site was established at 358 man-rem for the year 1997. As of October 16, the Year-To-Date (YTD) site collective dose was approximately 52 man-rem above the projected YTD site collective dose. The projected site collective dose was exceeded due to a 20 day extension of the Unit 1 RFO, several unplanned outages, and other emergent work. The ALARA goal for the Unit 1 RFO, which occurred earlier in the year, was 181 man-rem and the actual exposure was 222 man-rem. The inspectors noted that the projected goals for the exposure during the Unit 1 RFO and YTD site collective exposure were exceeded but midway through the current Unit 2 RFO the projected goals for exposure were being met. The inspectors also reviewed records for individual radiation exposures from the licensee's PERMS data base. Those records indicated that the YTD maximum individual exposures for Total Effective

Dose Equivalent (TEDE), skin, extremity, and lens of the eye were 1.8, 4.2, 4.9, and 1.8 rem respectively. The inspectors determined that those exposures were well within the occupational dose limits specified in 10 CFR 20.1202. During the inspection the licensee was in the process of an internal dose assessment for an individual that had ingested a small amount of radioactive material. Preliminary estimates indicated that the uptake was approximately 0.06 percent of the Annual Limit on Intake (ALI), or a Committed Effective Dose Equivalent (CEDE) of 3 mrem. Licensee records indicated that this event occurred on October 11, 1997, while the individual was performing a visual inspection of the fuel transfer equipment in the Unit 2 Fuel Building transfer canal. During the time that the individual was performing the work, the fuel transfer tube was open and the Fuel Building filtered exhaust fans were started. Air flow from the Unit 2 Containment Building through the transfer tube apparently swept radioactive particles into the Fuel Building through the transfer canal where the individual was working. Deviation Report S-97-2844 was initiated for this loss of contamination control event and the Operations Department was assigned the responsibility for taking corrective actions.

During tours of the RCA the inspectors noted that general areas and individual rooms were properly posted for radiological conditions. Posted survey maps were used to indicate dose rates and contamination levels at specific locations within rooms. At the inspectors' request, a licensee Health Physics staff member performed dose rate and contamination surveys in several rooms and locations. The inspectors verified that the survey instrument readings were consistent with the dose rates and contamination levels recorded on the posted survey maps. The inspectors also noted that housekeeping was very good throughout the RCA.

The inspectors also discussed with the licensee the primary coolant chemistry controls used during reactor shutdown for the Unit 2 RFO. Those controls included injecting additional boric acid into the coolant during cooldown and injecting hydrogen peroxide after cooldown in order to cause the release of radioactive material from the internal surfaces of the Reactor Coolant System (RCS). The radioactive material could then be removed from the coolant by the filters and demineralizers in the Chemical and Volume Control System (CVCS). The licensee indicated that approximately 176 curies (Ci) of cobalt-58 and 8.6 Ci of cobalt-60 were removed from the primary coolant. The overall effectiveness of these shutdown chemistry controls would be evaluated based on the reduction in the dose rates from specific locations in the plant and from specific pieces of equipment. The licensee indicated that the results of that assessment would be documented in the ALARA report which is scheduled to be issued 30 days after the RFO.

c. Conclusions

Based on the above reviews and observations, the inspectors concluded that the licensee was properly monitoring and controlling personnel

radiation exposure and posting area radiological conditions in accordance with 10 CFR Part 20.

Personnel entering the RCA were adequately briefed on radiological hazards and protective measures.

Housekeeping in the RCA was very good during the Unit 2 RFO.

A significant amount of activity was removed from the RCS by Shutdown Chemistry Controls in order to reduce exposure to workers during the Unit 2 RFO.

R1.2 Radiological Protection and Chemistry Controls (71750)

On numerous occasions during the inspection period, the inspectors reviewed Radiation Protection (RP) practices including radiation control area entry and exit, survey results, and radiological area material conditions. No discrepancies were noted, and the inspectors determined that RP practices were proper.

R8 Miscellaneous RP&C Issues (92904)

R8.1 (Closed) Violation 50-280, 281/97002-06: Multiple examples of failure to follow radiation protection procedures. RWP requirements were not followed when individuals failed to exit the RCA when their DADs alarmed and individuals entered the RCA without DADs. Licensee management issued memorandums to station personnel stressing management expectations for procedural compliance and personal accountability. A Root Cause Evaluation of these events determined that the arrangement of the area for in-processing to the RCA and the number of tasks required for RCA entry were distracting to workers. The flowpath for in-processing to the RCA was rearranged to focus personnel on entry requirements and, during periods of frequent entries, an individual was posted at the RCA entrance to monitor compliance with dosimetry requirements.

S1 Conduct of Security and Safeguards Activities

S1.1 General Comments

On numerous occasions during the inspection period, the inspectors performed walkdowns of the protected area perimeter to assess security and general barrier conditions. No deficiencies were noted and the inspectors concluded that security posts were properly manned and that the perimeter barrier's material condition was properly maintained.

S1.2 Compensatory Measures

a. Inspection Scope (81700)

Verified that the licensee employs compensatory measures when security equipment has failed or performance has been impaired and that the

compensatory measures employed do not reduce the effectiveness of the security system.

b. Observations and Findings

Three compensatory measures were evaluated and observed during the inspection. Security officers were posted as compensatory measures at the containment personnel and equipment hatches. Another security officer was posted at the vehicle access door for the spent fuel vital area. The officers were equipped with appropriate dosimetry and were aware of the procedural duties of their post. Appropriate security measures compensated for the vital area access breaches in effect during the ongoing outage. None of the compensatory measures were due to inoperable or malfunctioning equipment.

c. Conclusions

Through observations, discussions with security force personnel, and document review, the inspectors concluded that the licensee used compensatory measures for vital area access breaches.

S2 Status of Security Facilities and Equipment

S2.1 Protected Area Access Controls

a. Inspection Scope (81700)

Evaluated the licensee's access control program for allowing packages, personnel, and vehicles to enter the protected area to ensure compliance with criteria in Chapters 2, 3, and 4 of the Physical Security Plan (PSP).

b. Observations and Findings

The inspectors reviewed appropriate access control procedures to ensure that the licensee provided appropriate access controls for the protected areas.

Personnel, hand-carried packages or material, delivered packages or material, and vehicles were searched before being admitted to the protected area. Security personnel searched for firearms, explosives, incendiary devices, and other items that could be used for radiological sabotage. These searches were either by physical search or by search equipment. Vehicle searches included a search of the cab, engine compartment, undercarriage, and cargo areas.

The inspectors reviewed the following aspects of the personnel access control program. A coded and numbered picture badge identification system was used for personnel who were authorized unescorted access to the protected and vital areas. The codes corresponded to vital areas to which individuals had authorized access. Picture badges issued to nonlicensee personnel indicated the authorized access areas and showed

that no escort was required. Personnel displayed their badges while within the protected area. Visitors authorized escorted access to the protected area were issued a badge that showed an escort was required, and were escorted by licensee-designated escorts while in the protected area. The licensee used biometric hand geometry to ensure identification of individuals entering the protected area.

Access control program records were available for review and contained sufficient information for identification of persons authorized access to the protected area. The licensee maintained access records of keys, key cards, key codes, lock combinations, and other related equipment during a person's employment or for the duration that these items were used.

The inspectors reviewed the controls for entry and exit of packages and material to and from the protected area. Security personnel confirmed the authorization of, and identified packages and material at access control portals before allowing them to be delivered. The licensee used security force personnel and X-ray equipment to identify and confirm that prohibited material was not entering the protected area.

The inspectors reviewed vehicle access control. Individuals who controlled the admittance control hardware that allowed vehicle access to protected areas were protected in a bullet resistant alarm station. Armed security force personnel controlled the vehicle access search area. Security force personnel escorted nondesignated vehicles while within the protected area.

c. Conclusions

The evaluation of the protected area access controls for packages, personnel and vehicles revealed that the criteria of the PSP were being followed.

S2.2 Alarm Stations and Communications

a. Inspection Scope (81700)

Evaluated the licensee's alarm stations and communication equipment to ensure that the application of the criteria in Chapters 1, 4, and 6 of the PSP and Security Plan Implementing Procedure (SPIP)-03, "Central/Secondary Alarm Station Operation," Revision 3, dated January 29, 1997, were implemented.

b. Observations and Findings

The inspectors verified that annunciation of protected and vital area alarms occurred audibly and visually in the alarm stations. The licensee equipped both stations with communication equipment and limited closed circuit television (CCTV) assessment capabilities. Protected area alarms were assessed by security officers in defensive positions around the protected area. Alarm systems were tamper-indicating and

self-checking, and provided with an uninterruptable power supply. These alarm stations were continually manned by capable and knowledgeable security operators. The stations were independent yet redundant in operation. The central alarm station's interior was not visible from within or from outside the protected area, and no single act could remove the capability of calling for assistance or otherwise responding to an alarm. The walls, doors, floors, and ceilings of the alarm stations were bullet-resistant.

The licensee provided means for monitoring and observing, by human eye or CCTV, persons and activities in the isolation zone and exterior areas within the protected area. These means provided for assessing intrusion alarms for possible threats occurring in the isolation zone and exterior areas within the protected area. The transmission and control lines used in the CCTV intrusion alarm assessment system had line supervision and tamper indication.

The inspectors evaluated the equipment, operation, and maintenance of internal and external security communication links, and determined that they were adequate and appropriate for their intended function. Each security force member could communicate with an individual in each of the continuously manned alarm stations, who could call for assistance from other security force personnel and from local law enforcement agencies. The alarm stations had the capability for continuous two-way voice communication with local law enforcement agencies through radio and the conventional telephone service. The licensee had compensatory measures for defective or inoperable communication equipment.

Eight randomly selected Security Shift Blotters from October 22, 1994, to October 20, 1997, were reviewed to verify that security plan and procedure commitments in this area were being conducted and properly documented.

c. Conclusions

Based on this evaluation, the inspectors concluded that the licensee was complying with the criteria in Chapters 1, 4, and 6 of the Physical Security Plan and Security Plan Implementing Procedures for alarm stations and communications.

S2.3 Protected Area Detection and Assessment Aids

a. Inspection Scope (81700)

Inspected the licensee's protected area intrusion detection systems and assessment aids to verify that they were functionally effective and met licensee commitments in Chapters 2 and 4 of the PSP.

b. Observations and Findings

The licensee had installed intrusion detection systems that could detect attempted penetrations through the exterior isolation zones, and

attempts to gain unauthorized access to the protected area. The licensee segmented the intrusion detection systems into enough alarm zones to provide adequate coverage of the protected area perimeter barrier and isolation zones. The detection aids and alarm devices, including transmission lines, were tamper-indicating and self-checking. Sensors continued to function normally during loss of normal power. The licensee had compensatory measures to replace defective or inoperative detection aids. The inspectors found through document review and observation that the licensee had installed and tested detection and/or surveillance subsystems for the protected areas. The systems consisted of motion, thermal, and volumetric detection equipment to discover and assess unauthorized activities and conditions. These systems sent alarm conditions to response force personnel through the alarm stations and defensive positions allowing for response force personnel to assess and correct the conditions.

The licensee used defensive positions (towers) to provide the initial assessment and necessary response to the protected area alarms. The inspectors examined the licensee's defensive positions and found them to be adequately placed. They provided full fields of view and unobstructed observation of the protected area barriers and isolation zones. The licensee equipped these defensive positions with special equipment as defined in the PSP. Persons inside these defensive positions were protected within the UL752 criteria.

Eight randomly selected Security Shift Blotters from October 22, 1994, to October 20, 1997, were reviewed to verify that security plan and procedure commitments in this area were being conducted and properly documented.

c. Conclusions

Based upon the above evaluation, the inspectors concluded that the licensee's intrusion detection systems and assessment aids were functional, well maintained, effective for both covert and overt penetration attempts, and met licensee commitments.

S3 Security and Safeguards Procedures and Documentation

S3.1 Security Procedures

a. Inspection Scope (81700)

Reviewed a sample of implementing procedures to verify that the procedures are consistent with plan commitments and practices.

b. Observations and Findings

The inspectors reviewed two Virginia Power Administrative Procedures and twelve Security Plan Implementing Procedures. Five procedures were selected to verify commitments the licensee had made in the procedures. The procedures selected pertained to all security areas inspected;

procedural reviews, annual protected area perimeter and vehicle barrier system walk downs, annual key core rotations, annual key card inventory, and the vital area access authorization list.

c. Conclusions

The review and verification of commitments of selected security and administrative procedures did not identify any inconsistencies or noncompliance.

S3.2 Security Event Logs (SELs)

a. Inspection Scope (81700)

Review a sample of event logs to verify that the licensee appropriately analyzed, tracked, resolved, and documented safeguards events that the licensee determined did not require a one hour report to the NRC.

b. Observations and Findings

The inspectors reviewed quarterly SELs from the fourth Calendar Year (CY) Quarter (QTR) 1996 to the second CY QTR 1997. The total number of events for each QTR was 12 for the fourth QTR 1996, 27 for the first QTR 1997, and 40 for the second QTR 1997. The increases in the first two QTRs of 1997 were mostly related to an outage. The most significant logged events during these two QTRs were unsecured vital area doors (14) and lost badges (14). The Deviation Reports for these events were reviewed. These events were licensee identified, human error, nonwilful events with insignificant safety implications. The inspectors noted eight computer hardware events logged in the second QTR 1997. This issue was discussed in paragraph 2.1 of Inspection Report 50-280, 281/96-06. The security computer upgrade is still part of the key card upgrade program that is scheduled for early 1998. Noteworthy was that since January 1, 1996, to October 20, 1997, there have been only 16 security caused events documented in the SELs.

c. Conclusions

The review of three quarterly SELs verified that the licensee was appropriately analyzing, tracking, resolving, and documenting safeguards events.

V. Management Meetings

X1 Exit Meeting Summary

The inspectors presented the inspection results to members of licensee management at the conclusion of the inspection on November 25, 1997. The licensee acknowledged the findings presented.

The inspectors asked the licensee whether any materials examined during the inspection should be considered proprietary. No proprietary information was identified.

PARTIAL LIST OF PERSONS CONTACTED

Licensee

M. Adams, Superintendent, Engineering
R. Allen, Superintendent, Maintenance
R. Blount, Assistant Station Manager, Nuclear Safety & Licensing
D. Christian, Station Manager
E. Collins, Director, Nuclear Oversight
M. Crist, Superintendent, Operations
L. Hartz, Engineering Manager
B. Shriver, Assistant Station Manager, Operations & Maintenance
T. Sowers, Superintendent, Training
B. Stanley, Supervisor, Licensing
W. Thorton, Superintendent, Radiological Protection
H. Travis, Engineering NDE Manager

INSPECTION PROCEDURES USED

IP 37551:	Onsite Engineering
IP 40500:	Effectiveness of Licensee Controls in Identifying, Resolving, and Preventing Problems
IP 49001:	Inspection of Erosion/Corrosion Monitoring Programs
IP 50002:	Steam Generators
IP 61726:	Surveillance Observation
IP 62707:	Maintenance Observation
IP 71707:	Plant Operations
IP 71750:	Plant Support Activities
IP 73753:	Inservice Inspection
IP 81700:	Physical Security Program for Power Reactors
IP 83750:	Occupational Radiation Exposure
IP 92904:	Followup - Plant Support

ITEMS OPENED AND CLOSED

Opened

50-280, 281/97010-01	IFI	Review canal level probe RCE and corrective actions (Section O1.3).
50-280, 281/97010-02	IFI	Review licensee actions to resolve AMSAC enable setpoint issue (Section O1.5).
50-280, 281/97010-03	NCV	Failure to perform a required TS surveillance (Section O1.6).

50-280, 281/97010-04	URI	TS surveillance frequency requirement questions (Section M1.7).
50-281/97010-05	VIO	Inadequate work instructions resulted in the failure to implement the requirements of a safety evaluation (Section M1.8).

Closed

50-280, 281/97010-03	NCV	Failure to perform a required TS surveillance (Section O1.6).
50-280, 281/97002-06	VIO	Multiple examples of failure to follow radiation protection procedures (Section R8.1).